EFFECT OF FLIPPED LEARNING DESIGN ON ACADEMIC ACHIEVEMENT, SELF-DIRECTED LEARNING READINESS, AND RETENTION OF PUPIL TEACHERS

A

Synopsis

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1.0.0 INTRODUCTION

Information Communication Technologies has the power that can change many aspects of the lives. The impact of the ICT on each sector of the life across the past two-three decades has been enormous. The way these fields act today is different as compare to their pasts. Across the past twenty years the use of ICT has basically changed all forms of endeavor within business, governance and off-course education! As world is moving rapidly towards digital information, the role of ICTs in education becoming more and more important and this importance will continue to grow and develop in 21st century.

In recent years, several studies and reports have highlighted the opportunities and the potential benefits of ICT for improving the quality of education. ICT is viewed as a major tool for building knowledge societies. The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research (Yusuf, 2005). ICT have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005). The use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers (Wheeler, 2001). Changed pool of teachers will changed responsibilities and skill sets for future teaching involving high levels of ICT and the need for more facilitative than didactic teaching roles (Littlejohn et al., 2002). Students using ICTs for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools (Reeves & Jonassen, 1996).

Research has supported that active learning strategies result in higher student engagement and greater learning gains as compared to traditional instructor centered methods such as lecture. Our traditional method of teaching is not giving valuable outcomes. Research on classroom lectures has demonstrated that a student’s attention declines after the first 10 minutes of class, and although it may return at the end of a class, students remember only about 20% of material present during the lecture. The traditional pattern of instruction use to give students the task of

reading textbooks and work on problem sets outside school, while listening to lectures and taking tests in class. Technological innovations that have the potential to increase student learning appear daily. Over the past decades education standards have emphasized the potential value of student-centered learning environments in which students are actively engaged in higher-order tasks and taking charge of their own learning (Hannafin, Hill, & Land, 1997; Shea et al., 2012). Student-centered learning environments necessitate applying more active learning strategies to classroom teaching that, for example, involve student presentations, small group problem solving, self and peer evaluation, and group discussions. Yet, creating such environments remains a challenge. The question then arises as how much are we supposed to teach? How much do we allow them to learn by their own? Here comes the tool called "flipped Learning " which is also known as inverse, reverse, backwards classroom or flipped classroom, which hints the answer to the previous questions.

Knight and Wood (2005) carried out a study where they examined the work of the National Research Council (1999). The NRC found that student understanding of concepts was more effective when students were actively engaged in learning rather than in passive lecture based environments. Knight and Wood conducted an experiment in an upper-division Biology course to determine if learning gains could be made by changing the class to a more interactive format. The results of the study paralleled other studies (Slekiene & Raguliene, 2010, Sternberger, 2012) that found higher learning gains and greater conceptual understanding in interactive courses.

Flip learning act as an innovative tool which helps the teachers to shift away from direct instruction as their constitutional teaching tool toward the student-centered approach has modified the whole process of learning. It is about how to use you in-class time best with the students. This will help in increasing the skills of the students-critical thinking skills, analytical skills, problem-solving skills, learning skills.Flipped learning is a popular pedagogical approach it can be described as an "events that have traditionally takenplace inside the classroom now take place outside the classroom and vice versa" (Lage et al. 2000). Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the

individual learning space and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concept and engage creatively in the subject matter.(Flipped Learning Network 2014).According to Verleger and Bishop (2013), this education system is a learning and teaching model which enables students to conduct mainly individual or group problem solving activities and to focus on the problems experienced by most of them and which gives the teacher the opportunity to deal with the learner individually (Seamen & Gaines, 2013). On the other hand, this approach also supports individual learning by enabling students to access the information they want in the place and time they want through the video records they have (Talbert, 2012). With reference to these definitions, the flipped learning, is defined as the Pedagogical approach in which students learn theoretical information with the help of various teaching materials out of school and participate in the activities based on higher-order cognitive strategies for problem solving, group work, and individual guidance provided by the teacher .

A 'learning design' is defined as the description of the teaching-learning process that takes place in the unit of learning. The key principle in learning design is that it represents the learning activities and the support activities that are performed by different persons (learners, teachers) in the context of a unit of learning. These activities can refer to different learning objects that are used during the performance of the activities (e.g. books, articles, software programmes, pictures), and it can refer to services (e.g. forums, chats, wiki's) that are used to collaborate and to communicate in the teaching-learning process.

THE FLIPPED LEARNING DESIGN

The Flipped Learning design model presented here is based on the ADDIE model. The process begins with planning, followed by programming, and then Coaching. Evaluating occur continually throughout the process and act as valuable mechanisms for monitoring progress and identifying achievement. At each stage of the process, instructors base their decisions on the requirements of the course curriculum, and, equally importantly, on their students' needs.

The diagram below shows the process of Planning, Programming, Coaching, and Evaluating. The steps will be described in sequence below.

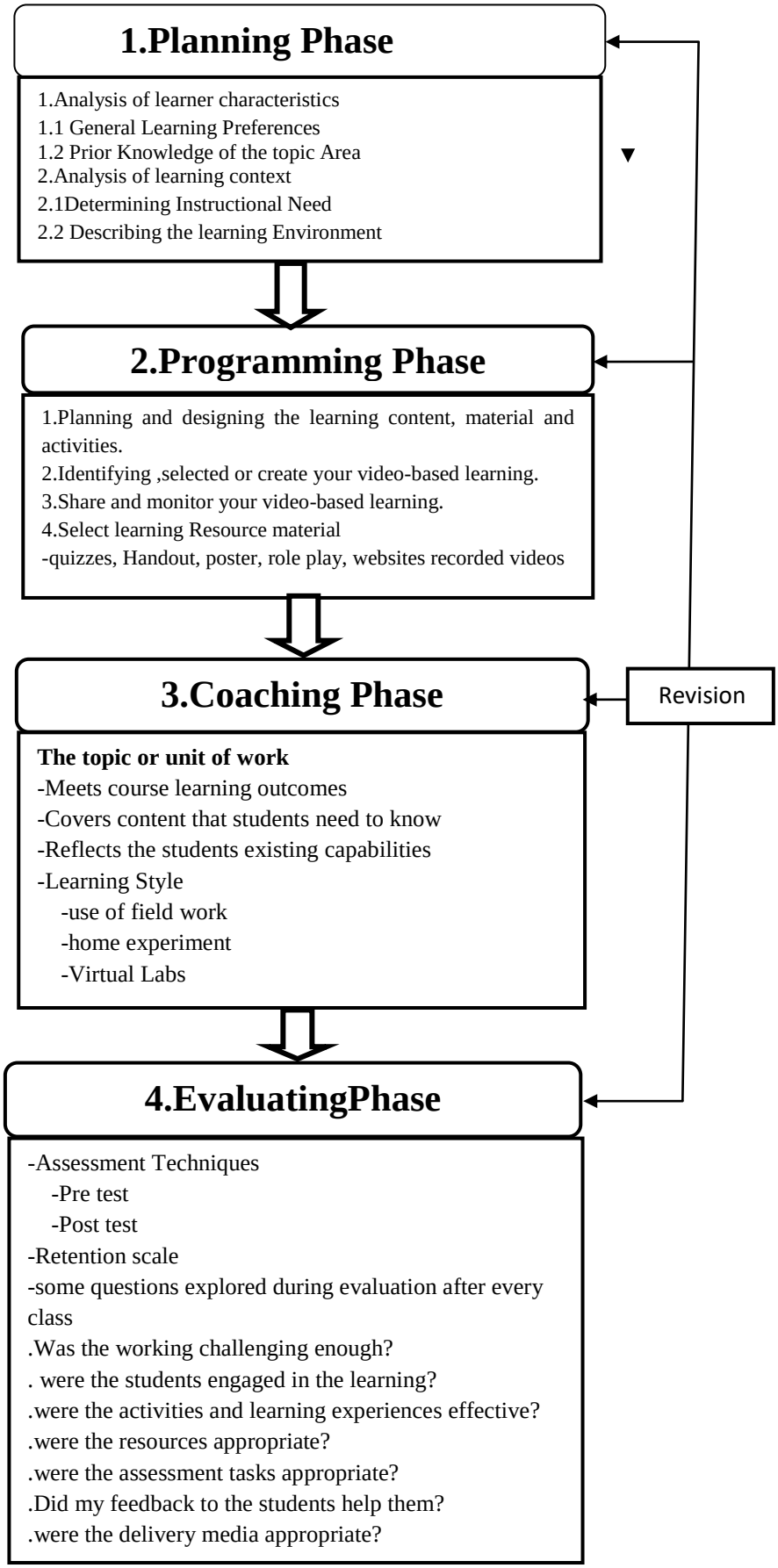
1.Planning Phase
1.Analysis of learner characteristics
1.1 General Learning Preferences
1.2 Prior Knowledge of the topic Area
2.Analysis of learning context
2.1Determining Instructional Need
2.2 Describing the learning Environment
2.Programming Phase
1.Planning and designing the learning content, material and activities.
2.Identifying ,selected or create your video-based learning.
3.Share and monitor your video-based learning.
4.Select learning Resource material
-quizzes, Handout, poster, role play, websites recorded videos
3.Coaching Phase
The topic or unit of work
-Meets course learning outcomes
-Covers content that students need to know
-Reflects the students existing capabilities
-Learning Style
-use of field work
-home experiment
-Virtual Labs
Revision
4.EvaluatingPhase
-Assessment Techniques
-Pre test
-Post test
-Retention scale
-some questions explored during evaluation after every class
.Was the working challenging enough?
. were the students engaged in the learning?
.were the activities and learning experiences effective?
.were the resources appropriate?
.were the assessment tasks appropriate?
.Did my feedback to the students help them?
.were the delivery media appropriate?

FIGURE:1.1 FLIPPED LEARNING DESIGN

Planning Phase

Effective Learning don't come together by accident. They require planning and analysis. You'll produce the best Learning design if you first analyze two important areas

The analysis of learner characteristics.

The analysis of learning context

The analysis of learner characteristics:

One of the main focuses of flipped learning is the idea of individualized learning. "Flipped learning as its core, is individualized learning" (Bergmann and Sams, 2014). In order for there to be a chance of that happening, it's important to know who your learners are. Remember that we are not teaching to groups, but to groups of individuals. In addition to general characteristics such as age, grade level, and topic being studied, we should be able to describe our learners in terms of these characteristics as Dick and Carey (2001) pointed out:

Entry Behaviors: These are skills associated with learning the goal that must already be mastered. What should learners already know how to do in order to be successful with the new instruction?

Prior Knowledge of the Topic Area: What must learners already know about the topic?

Attitudes toward Content and Potential Delivery System: What are the learners' impressions and attitudes about a topic and how it might be delivered? In other words, will they have any preconceived notions about the topic or the delivery system?

Academic Motivation: How motivated are learners to learn the topic, and how much is it likely to interest them? we might want to ask potential learners these questions :

How relevant is the instructional goal to you ?

What aspects of the goal interest you most ?

Educational and Ability Levels: What are the achievements and general ability levels of the learners? This helps determine the kinds of instructional experiences they may have had and their ability to cope with new and different approaches to instruction.

General Learning Preferences: What types of learning approaches do the learners prefer? For example, lecture, seminar, case study, small-group, or web-based?

That may seem like a lot of information to collect about our learners, but it can aid us immensely in providing more meaningful learning experiences for the learners. Some of it we may already know, but much of it should be culled by talking with learners. Other helpful methods include surveys, questionnaires, and pretests.

The list of learner characteristics we end up with will be used throughout the remainder of the learning design process to make decisions regarding the various steps.

The analysis of learning context involves two steps:

Determining Instructional Needs:

Before establishing the instructional goals, we must analyze the learning environment and reflect on what has been done previously to identify the areas that should receive special emphasis in the course. The process, which is called "learners needs" or "needs analysis", consists of identifying the topics to be included, determining what it is that learners need to know, and data regarding student performance.For teacher needs analysis is often informal but is nevertheless very important. Such needs analysis can be directed at determining :

What are the major topics to be covered ;

What portion of curriculum involves learning tasks that students had difficulty in learning and

Which learning tasks, therefore, needs to be designed, modified or redesigned ?

Describing the Learning Environment :

By knowing a little bit about our learners we can better arrange the environment to increase the probability of individual student learning. The primary task of this analysis is to think about the environment in which the instruction will take place. It should enable us to analyze all factors that affect and are affected by the flipped learning that we will provide .

It is always wise to consider, beyond the classroom, the larger learning system into which the classroom environment belongs.It is important that learner support each other and share their expertise, information and ideas throughout the teaching-learning cycle. wealso need access to a range of resources, ideas and solutions as they work through the process of planning.

Planning is done both within learning area groups and across learning area groups, and across learning areas and grades. This whole approach ensures that teaching ideas and classroom

experiences are shared and available to everyone when the programs and units of work are being developed.

Programming Phase

The Programming phase deals with learning outcomes, identifying the content, exercises, learning activities and delivery mode. The Programming phase should be systematic and specific.At the start of Programming phase, we should have a pretty good idea of what the learners/students will already know when they start the course (through a learner analysis). The instructor should also know what learners will need to learn during the course (learning outcomes).

Steps in the Programming Phase:

There are basically some steps in Programming phase :

Planning and designing the learning content, materials, and activities.

Identifying, selected or create your video-based learning.

Share and monitor your video-based learning.

Select learning resource material -quizzes, Handout, poster, role play, websites, recorded videos

Planning and designing the learning contents, assessments and activities.

Learning activities are used in education because they facilitate effective communication, especially if it's educational technology tools (Danielson, 2011). They help learners to process and retain what they learn, as well as enhancing the instructor's credibility. Therefore, they should be simple, clear, active and professional. The learning contents or video-based learning used by teacher must enhance the learning. Wemust consider the topic, why we are flipping it, how this topic relates to capabilities that count? Identify established misconceptions around this topic and address these in the pre class activities and make links with assessment explicit.

Well-designed learning contents shorten coaching time and increase comprehension substantially. They can increase participation of learners, and facilitate group consensus.

Identifying, selected or create your video-based learning:

Technology must be used to improve the efficiency and effectiveness of the learning delivery process. This may be quite a change from traditional teaching procedure adopted by instructors. Here are plenty of good, educational videos from websites such as TED-Ed and Khan Academy, and online course sites such as edX, courser, and Alison allow you to get your students in. But, to achieve truly comprehensive educational goals, we must take the advantage of educational technology on the market. This means that we have to create their own video-based learning. according to the learning outcomes and the topic that they cover. When teachers create their own video-based learning they must remember to keep the lower-order things on Bloom's taxonomy to the videos and the higher-order things in class. (Bergmann, Sam 2012).

Plan, share and monitor your video-based learning: In this step we have to plan how we are going to share your video, so here we are using learning management system. All we need to do is upload the video and then add your students to the course and then monitor the activity to make sure everyone is logging in to view the material.

Select Learning Resource Material: In this step we have to select Learning Resource material which is appropriate for our course like quizzes, handouts, poster, role play.

Coaching Phase

Gagne described instruction as asset of events external to the learner design to support the internal process of learning (Gagne, 1985). Samaldino state that "instruction is the arrangement of information and the environment to facilitate learning. This may be done by the learner or the instructor" (Smaldino, 2005). The learning styles of the learners must be taken into consideration in the Coaching Phase. Learning styles include the way a person perceives the world and new information, their unique experiences and the motivation they have for learning a particular topic (Gulid & Garger, 1998; Fralick, 2011).Research has shown that, the more involved and interested students are in what they are doing, the more they learn. Using learning strategies in which our students are ‘saying and doing’ improves their learning enormously (Smaldino, 2005), (Gulid & Garger, 1998; Fralick, 2011), (Danielson, 2011). When we stand

out the front of a room and lecture, our students' learning is far less effective, especially where this is our 'normal' teaching method.

The learning strategies we choose are important in ensuring that students are challenged and enjoy learning. They enjoy learning when that learning is relevant to them. They are also more likely to be challenged and engaged if they are actively involved in the learning activity. Tsai et al. (2015) state that "Flipped learning helps instructors move away from direct instruction as their primary teaching tool toward a more student-centered approach" (Tsai, et al., 2015). It is the learner who does the learning. Instructors can, of course, guide the process, but student develop understanding through what they do (Danielson, 2011).

Here are just some steps that we use it during the coaching phase:

Set up the physical space to accommodate group based learning and organize learning resources review student responses to the video, at the start of the class

Select the relevant concepts, related content and group learning activities e.g., flow charts, role play, quizzes, posters, and also select appropriate learning style like field work, home experiments, Lab works etc. which require students to apply and analyze the core concepts covered in the video ,clarify remaining learning issues, deliver classroom learning activities and mini lectures as needed and 'time on task' - monitor allocated time dedicated to each classroom activity Summarize the learning segments by reviewing the learning outcomes.

Evaluation Phase

The evaluation phase measures the program's efficacy and make sure that the students achieve the expected learning outcomes.

Mary Thorpe (1988) see evaluation as "the collection, analysis and interpretation on information about any aspect of a program of education and training, as part of a recognized process of judging its effectiveness, its efficiency and any other outcomes it may have" (Thorpe, 1988). Evaluation must be seen as an ongoing process that is initiated in the earliest stages of program planning and continued beyond program completion.

Here evaluation design should be based on the pre test and post test outcome improvement effort .And the evaluator ensure the quality of the Learning design process by asking questions

that focus on the value of the program in achieving improvement goals and critiquing it with a short-term evaluation questions checklist. At the end the learning outcome is also assessed by Retention Scale.

1.1.0 HISTORY OF FLIPPED APPROACH

The flipped approach is considered a recent idea in the education field. The most commonly cited creators of the flipped approach are Jonathan Bergmann and Aaron Sams when they flipped their high school chemistry classes in 2007 (The Flipped Classroom 2011). Bergmann and Sams flipped their classes and found that their students' test scores improved. They began publicizing their findings and developed a non-profit organization to assist other teachers in the process of flipping their classrooms.In only a few short years, their website, flippedlearning.org, reported that they grew to have over 22,000 registered users who are actively flipping their classroom.

The goal of a flipped design is to move the students' initial exposure to course content outside of the classroom so that in-class meetings can be used for direct student engagement (with the instructor, with each other, and with course content

The study of flipped learning design is based on the theory of Bloom's revised taxonomy of cognitive domain. This taxonomy provides six levels of learning. The explanation is arranged from the lowest level to the highest level:

1. **Remembering:** in this stage, the students try to recognize and recall the information they receive; they also try to understand the basic concepts and principles of the content they have learned.

2. **Understanding:** the students try to demonstrate their understanding, interpret the information and summarize what they have learned.

3. **Applying:** the students practice what they have learned or apply knowledge to the actual situation.

4. **Analyzing:** the students use their critical thinking in solving the problem, debate with friends, compare the answer with peers, and produce a summary. The students obtain new knowledge

and ideas after implementing critical thinking or a debate in group activities. In this level of learning, the students also produce creative thinking.

5. **Evaluating:** assessment or established peer-review knowledge, judge in relational terms; in this stage, students are evaluating the whole learning concepts and they could evaluate or make judgment on how far they successfully learned.

6. **Creating:** the students are able to design, construct and produce something new from what they have learned (Bloom, 1969).

In implementing flipped learning design, remembering and understanding as the lowest levels of cognitive domain are practiced outside the class hour (Krathwohl & Anderson, 2010). While in the classroom, the learners focused on higher forms of cognitive work, including applying, analyzing, evaluating, and creating.

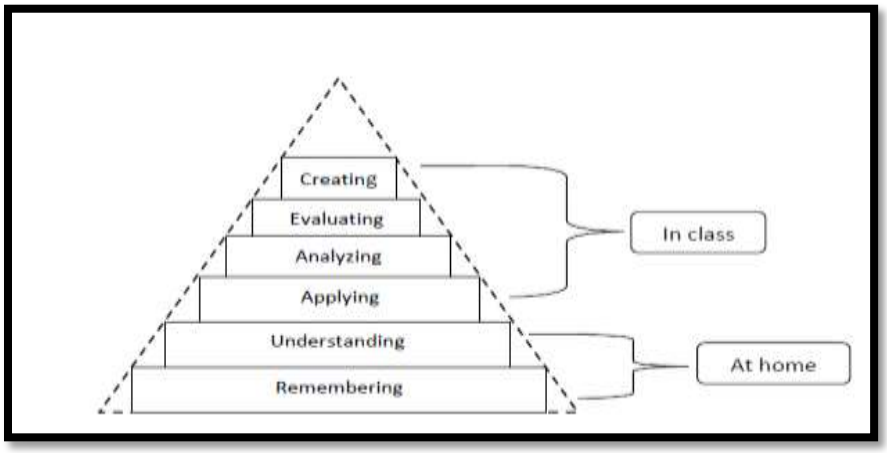

Fig1.2: Bloom revised taxonomy in the flipped learning (Zainuddin & Halilli 2016)

With the flipped learning design, the lower levels are presented before class through recorded lectures and video. Readings, simulations, and other materials also provide foundational support for learning so that in-class time can be spent working on higher levels of learning from application to evaluation. In flipped learning, students go from the lowest level (remembering) to achieve the highest level (creating). Additionally, Nederveld and Berge (2015) added that in flipped learning, classroom activity is spent on application and higher-level of learning rather than listening to lectures and other lower-level thinking tasks. As shown in Table 1, implementing flipped learning allows the students to spend more time supporting higher-level

learning tasks such as a group discussion, while lower-level tasks such as knowledge and comprehension are completed independently outside the class.

LEVEL OF LEARNING	TRADITIONAL LEARNING TOOLS	FLIPPED LEARNING TOOLS
Remembering	Face-to-face lecture	Pre recorded lecture, reading material and watching video lecture independently
Understanding	Questions and answers	Reflection, peer to peer discussion and collaboration
Analyzing	Homework	Classroom activities such as a group discussion
Applying, Evaluation Creating	Homework or nothing	Student project, fieldwork,presentations, peer evaluation and instructor evaluation.

Table 1: Comparison between traditional learning and flipped learning in achieving higher order thinking of blooms taxonomy

1.2.0 BASIC ASSUMPTIONS OF FLIPPED LEARNING

Currently, there are three assumptions about flipped learning that tend to dominate the research arena within first or second language acquisition:

1.Students enjoy flipped learning more than traditional learning (Doman & Webb, 2017).

2.Students perform better in flipped classrooms versus traditional classrooms (Obari & Lambacher, 2015).

3.Students become more autonomous when exposed to flipped learning (Han, 2015)

Student academic achievement are of prime concern in the education system because academic success (i.e performance) has been shown to be a predictor of success in later life (Kautz et al.,2014).According to a 2014 research conducted by the education week research center ,83% of teachers and administrators participating in the study consider student engagement ,self directed learning and motivation “very important” in overall academic performance (Engaging student for Success,2014).Research on the effect of the flipped learning and its impact on

academic achievement are sparse at the time due to the relative newness of the idea of the flipped approach. Today the general problem of education is decline in academic performance and the cause of decline in academic performance are numerous .Previous studies of flipped learning reported that the student in flipped learning performed overall significant better than the student in traditional classroom (Bhagat et al.2016; Chao et.al 2015 ;Schultz et.al 2014).

Effective use of the flipped learning requires the development of students' several skills. One of these skills is self-directed learning. Knowles (1975) defines self-directed learning as the process of being able to attempt for learning, defining one's own learning needs with or without getting help from others, setting learning goals, identifying sources for learning, choosing and applying the right learning strategy about the information to be learned, and assessing the learning outcomes. Guglielmino (1977) defines the situations and variables that affect readiness and that are associated with readiness as having wide learning opportunities, attempting for learning, consciously accepting the responsibility for learning, loving to learn, being productive, and looking to the future. On the other hand, there are various cognitive, affective and independent variables necessary and required for both self-directed learning process and self-directed learning readiness (Clardy, 2000; Merriam & Caffarella, 1999). Based on the above-mentioned views, beside the constructs to be owned by an individual for self-directed learning readiness, some skills owned by the cognitive, affective and kinesthetic skills are important. In addition, these features are known to be the features required for applying the flipped learning design effectively. Given that the flipped learning method could have effects on self-directed learning; this study aims to investigate this effect.

"Perception is an active process as one selectively perceives, organizes and interprets what one experiences. Interpretations are based on the perceivers past experiences, assumptions about human behavior, knowledge of the others circumstances, present moods / wants / desires and expectations." according to Steward L. Tubbs & Stylvia Mors .Some of the findings from research conducted thus far would indicate that student have a positive association with the flipped instruction (Herried 2013). Zappe (2009) and Ruddick (2012) flipped our college class and both found that student perceived the flipped instruction as a better or more efficient

method of teaching. Schultz et.al (2014) found that “most students had a favorable perception about the flipped classroom noting the ability to pause, rewind and review lecture"

On the other hand, another important concept about learning and behaviors is retention. Fulfilling active learning in the flipped instruction can be reported as a reason for more permanent learning in the experimental group. Studies supporting this finding, students stated that they fulfilled more effective learning with class activities (Frydenberg, 2013; Zappe et al., 2009). Analysis of studies in the literature showed that very few studies have examined the effect of the flipped learning designon retention, and the limited number of studies has shown similarity with the findings of this study. Similarly, Kim et al. (2014) concluded that the flipped education had a positive effect on retention and that FC students' retention scores were higher than those who used the traditional education method. For this study retention is defined as the amount of information that a student can retain during the intervention time.

1.3.0 EMERGENCE AND JUSTIFICATION

In Indian scenario, changes in the teaching learning strategies take place day by day from traditional to innovative teaching strategies. In traditional strategy teacher is being a controller of environment. Power and responsibilities are held by the teachers they regard the students are having knowledge holes that need to be filled with information therefore teacher imposes knowledge on students which makes the students passive and bored in teaching learning process. This creates the keen interest in the educationist and intellectual to think about the innovative educational practice that can make learning more active and provide pleasant experiences, having worth for the students and students be actively involved in their own process of learning hence come to need a teaching learning method which makes the learning active and promote self-innovative attitude. Flipped Learning is such a strategy which fulfill these all purposes. Barbara walvoord and Virginia Johnson Anderson promoted the use of this approach in their book Affective Grading (1998). They purpose a model in which students gain first – exposure learning prior to class and focus on the processing part of learning (synthesizing, analyzing, problem-solving etc.) or class.

Bormann (2014) investigated the Affordances of flipped learning and its effects on student engagement and achievement. The purpose was to explore the effectiveness of a flipped classroom model on student engagement and achievement as well as the affordances of a flipped model vs. that of a traditional model. The major findings reveal that flipped learning can afford students a more engaging environment that can lead to higher achievement and a better preparedness for 21st-century learning and work environments. Zownorega (2013) The effectiveness of flipping the classroom in a Honors level, Mechanics-Based Physics class .This study is different from the previous Study .Here the researcher applied full –fledged modeling methodology rather than partial modeling methodology. The purpose of the study was to test how "modeling "classroom is affected when classroom is flipped. The Result shows that the flipped classroom did not show any growth in student Performance. Johnson G.B. (Jan 2013) Student perception of flipped classroom. The purpose of this study was to provide insight about the Flipped Classroom with an emphasis on student perceptions. The results from the surveys supported the hypothesis that the majority of students enjoyed the Flipped Classroom experience. Johnson W.L & Jeremy D. Renner (March 2012) Effect of the flipped classroom on a secondary computer applications course, student and teacher perception and student achievement. The purpose of the study was to examine traditional and flipped course delivering method efficacy .And the perception an academic result of flipped classroom while using technology as a supporting tool. Result found no significant different between the mean pre and post test and do not provide any evidence that flipped learning change student attitude. Kathy Missildine & Rebecca Fountain & Lynn Summer (March 2013) Flipping the Classroom to Improve Student Performance and Satisfaction. The purpose of the study was to determine the flipped learning effect on student academic achievement by using innovative technology and strategies. Result shows that examination scores were higher for the flipped classroom but the student shows less satisfaction toward flipped classroom. Overmyer G.R. (2014) The flipped classroom model for college algebra: Effect on student achievement. The purpose of the study was to assess the benefit of changing the paradigm for student achievement. The finding shows that student taught through flipped Instructional approach show better scores than student in the

traditional section. Sirakaya A.D. (2018) study the effect of flipped classroom model on Academic achievement, self directed learning readiness and motivation. This study compared flipped classroom with blended learning method .The purpose of the study is to examine flipped model effectiveness on individual self-directed learning readiness skill and motivation. Study findings shows significant difference between both the groups. Minjeong (2018) conducted the study effect of self directed learning Readiness on academic performance and Perceived usefulness for each element of flipped learning. The purpose of the study was to examine SDLR effect on academic performance by the completion rate of pre class online learning and final exam score but at the end findings observed that there is no significant difference in final exam score of the students. McHugh A.S. (june2018) Evaluating the Effects of a Flipped Classroom Compared to a Traditional Classroom on Retention of Information and Course Engagement in a Radiation Safety Course. The study aimed to compare the flipped and traditional classroom pedagogies at increasing retention and critical thinking skills. The result found significant in the favor of flipped classroom is helpful in retention of information. Graham K.L& Amy Cohen &Reynolds E.E .The purpose of their study was to check the knowledge acquit ion and retention of the flipped classroom method with didactic teaching. The result shows that student were satisfied with flipped classroom learning .A flipped classroom showed greater effectiveness in knowledge gain and retention as compared with a standard approach in an ambulatory residency environment.

Previous researches and their findings raised some research questions such as:

1. Can the weakness of the traditional method of imparting instructions be overcome by the flipped Learning Design instruction material?

2. Does flipped Learning Design has any effect on the achievement of pupil teachers?

3. Does flipped Learning Designhas any effect on the self learning readiness of pupil teachers?

On the basis of the above studies researcher finds that the lot of work has been done in foreign countries but in Indian context much research work in this area has not been done .Several studies on the flipped classroomhas been conducted in relation to these variables like co-operation, active learning and student stress etc. but researcher does not across through any

study on flipped learning Design in relation to these variables. Hence the researcher decide to carry out his research study on "Effect of flipped Learning Design on academic achievement, self-directed learning readiness and retention of pupil teachers". which is a practical necessity for improvement in the quality of education as it a great issue to concern among educationist, policymakers and researchers .The present work will also be conceived as a provide empirical evidence for the above claims in the previous researches.

1.4.0 Statement of the Problem:

Effect of Flipped Learning Design on Academic Achievement, Self Directed Learning Readiness, and Retention of Pupil Teachers.

1.5.0 Definitions of the term used in the study:

1.5.1 Flipped Learning:

Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concept and engage creatively in the subject matter.(Flipped Learning Network 2014)

1.5.2 Flipped Learning Design: A flipped Learning design is defined as the description of teaching learning process that take place in the unit of learning .The key principle of flipped learning design is that it represent the all learning activities like classroom activities, field visit ,home experiment, Lab visit , resource material, assessment, evaluation etc. and act as supportive pedagogical model to achieve the required learning objectives.

1.5.3Academic Achievement:

Academic Achievement is the outcome of learning and is the extent to which a student has met his or her goals in the classroom. (Gajda, Karwoswoski, & Beghetto,2017)

1.5.4Self -Directed Learning Readiness:

Knowles (1975) Self-directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating their learning

goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes".

1.5.5 Retention:

Vocabulary dictionary define retention as “the ability to recall, recognize and hold what has been learned or experienced”.

In the study retention refers to ability of students to recall what has been learned after implementation of flipped instructional material after a certain interval of time.

1.6.0 Objectives of the study:

The objectives of the present study are as follows:

1. To develop the Instructional material based on flipped learning design for the Pupil Teachers of Pedagogy of Science.

2. To develop online learning platform for execution of flipped learning design.

3. To study the effect of flipped learning design on pupil teachers Academic Achievement.

4. To study the effect of flipped learning designonpupil teachers Self Directed Learning Readiness.

5. To study the perception of pupil teachers towards the flipped learning and traditional learning.

6. To study the effect of flipped learning Design on Retention of Pupil Teachers.

1.7.0 Hypotheses:

The null hypotheses of the present research work are as follows:

Ho1: There will be no significant difference in mean gain academic achievement scores of the student taught through flipped Learning Design and traditional Learning.

Ho2: There will be no significant difference in mean gain self directed learning readiness scores of the student taught through flipped Learning Design and traditional Learning.

Ho3: There will be no significant difference in mean gain retention score of the student taught through flipped Learning Designand traditional Learning.

Ho4: There will be no significant difference in mean gain perception scores of the student taught through flipped Learning Design and traditional Learning.

1.8.0 Variables of the study:

In the experimental phase of the study the following variables will be taken into consideration.

1.8.1 Independent variables:

Flipped learning Design

1.8.2 Dependent variables:

- Academic Achievement
- Self-Directed learning Readiness
- Retention

1.8.3 Extraneous variables:

These variables will be controlled as shown in the following table:

Category of Variables	Variables	Controlling techniques used
Subject related Variables	Age Sex	Sample selection
	Motivation	Rapport establishment
Environment related Variables	Classroom Noise	Rapport establishment Removed
	Light Test time Test administration	Constancy
Sequence related variables	Practice	Eliminated
	Fatigue	Eliminated
	Cooperation	Constancy

Table 1.2: Method of Controlling Extraneous variables

1.9.0 Delimitations of the study:

The study will be delimited in the following ways:

1. The study will be delimited to Agra city only.

2. The study will be delimited to B.Ed pupil teachers.

3. The study will be confined to only Pedagogy of science teaching.

1.10.0 Method of the Study

This study follows a pre-test and post-test quasi-experimental design to examine the effectiveness of flipped/traditional learning instructions in enhancing the performance of B.Ed Pupil Teachers.

1.11.0 Sample of the study

For this study B.Ed. pupil teachers will be treated as sample. Purposive sampling is used in the study. In all 70Pupil teachers of Pedagogy of Science will be selected randomly and placed in Flipped and Traditional modes of instruction (N = 35 in each group).

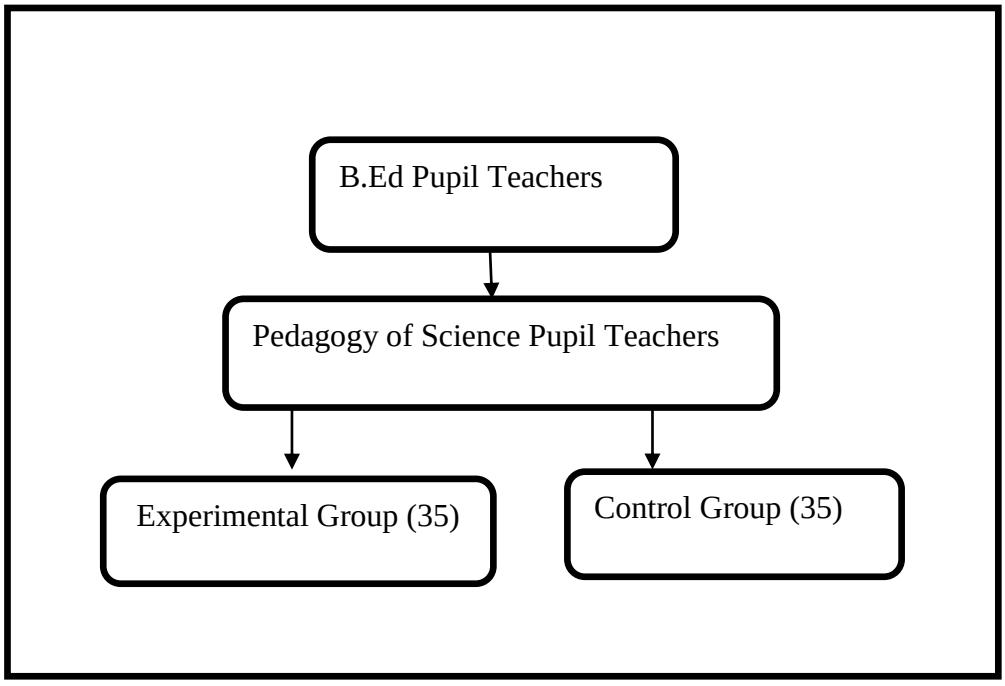

Fig1.3: Process of Sample selection

1.12.0 Research Design of the Study:

Two group pre-test and post-test designs will be used in the present study:

<table>
<tr><td colspan="8">PHASE I- Online learning platform and Content development for flipped Learning Design</td></tr>
<tr><td colspan="8">PHASE II – Experimentation of flipped content with the help of developed flipped learning Design(Planning and coaching phase)</td></tr>
<tr><td colspan="4">EXPERIMENTAL GROUP</td><td colspan="4">CONTROL GROUP</td></tr>
<tr><td>Sample</td><td>Treatment</td><td>Duration</td><td>Research tool</td><td>Sample</td><td>Treatment</td><td>Duration</td><td>Research Tool</td></tr>
<tr><td>B.Ed. Pupil Teacher (N=35)</td><td>Orientation and Access of flipped learning Design With the help of Developed Instructional Material</td><td>15 days(1 hour per day)</td><td>Perception Scale</td><td>B.Ed. Pupil Teacher (N=35)</td><td>Orientation flipped learning design With the help of Traditional Material</td><td>15 days(1 hour per day)</td><td>Perception Scale</td></tr>
<tr><td colspan="8">PHASE III- Assessment of effectiveness of flipped learning Design by developed material</td></tr>
<tr><td colspan="4">EXPERIMENTAL GROUP</td><td colspan="4">CONTROL GROUP</td></tr>
<tr><td>Sample</td><td>Treatment</td><td>Duration</td><td>Research tool</td><td>Sample</td><td>Treatment</td><td>Duration</td><td>Research Tool</td></tr>
<tr><td>B.Ed Pupil Teachers (N= 35)</td><td>Execution of developed Material for Flipped learning design</td><td>30 days (1 hour per day)</td><td>1.SDLR Scale 2.Achievement test 3.Retention scale</td><td>B.Ed Pupil Teachers (N=35)</td><td>Teaching lessons using Traditional Approach</td><td>30 days (1 hour per day)</td><td>1.SDLR Scale 2.Achievement test 3.Retention scale</td></tr>
</table>

1.13.0 Administration of Tools

1) Self-Directed Learning Readiness Scale (SDLR) by Fisher2001

2) Perception Scale toward flipped learning (Self constructed)

3) Academic Achievement Test (Pre-instruction content knowledge test and Post-instruction learning outcomes measures designed by the researcher base on Pedagogy of Science syllabus).

4) Retention Scale (self constructed)

1.14.0 Statistical Techniques:

The data will be analyzed in light of objectives of the study. Certain Descriptive and Inferential statistics will be used in order to describe the nature and distribution of the scores obtained on various tests. This will include following method of analysis:

1. Mean: Mean value will be calculated for the distribution of academic performance scores, self-directed learning readiness scores, retention scores, perception scores.

2. Standard Deviation: It will be calculated to study the variation in the scores.

3. t-Test: Inferential Statistical techniques such as t-test will be employed for testing significance of the difference between the experimental and control group on the basis of pre-test ,post-test scores.

1.15.0 Significance of the study

In the changing world student facing new challenges to gain knowledge and achieving their goal. Students having proper knowledge can sustain long run growth of the country. There is the need to upgrade teacher's capabilities in our country, especially with regard to technology. The present research work is an endeavor in this direction. This will encourage teachers to adopt new or innovative approach of teaching and they have more individual time with students and have come to understand their mood, learning style, and needs better than I have in the past because the flipped learning allows teachers to step away from the front of the room and address their individual needs rather than the needs of the majority. Instead of asking the parents what

the child was doing at home to assist in learning. Teachers is able to tell the parents what his child was or was not learning and why.

Flipped learning design based teaching will develop independent thinking, creativity and problem solving ability in students.It will facilitate higher order of thinking among them. With the help of flipped learning students can access their content at anytime and anywhere according to their need. This research study is very closely associated with present scenario and of great importance of education today .Education is the most powerful thing in the world for ever individual .But there are so many barrier come in the path of receiving knowledge. So with the help of various researches we come to find the solution and remove those obstacles in the learning and these researches outcomes show that technology is also playing important role in enhancement of our teaching learning process.

The result of this study would be more beneficial to the teacher, parents, administrators and policymakers.

1.The student will be highly benefited .It will develop Independent learning skill among student .It is also beneficial because here student are not a passive listener in classroom but actively engaged in whole learning process and therefore they attain a better knowledge and understand the concept easily.

2. It would be more helpful for teacher that it will increase the achievement rate of the student that can show their better teaching performance.Present research work will help teacher to plan, develop student center learning which make them self-active learner and it will also encourage future teachers to adopt new & innovative technology based teaching approach for their effective teaching.

3. It will be beneficial for policymaker to bring changes and framing policy according to the Need and beneficial for our present time. That today is a time of technology so we should accept it in our education field also.

4. It would also be beneficial for parents to provide guidance in doing homework and correlate the real situation and also provide proper information that what is the Performance of their children in the classroom or at home also.

References:

Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. Eugene, Or: International Society for Technology in Education.

- Bormann J. (2014) Affordances of flipped learning and its effects on student engagement and achievement (Doctoral Dissertation,University of Northern Iowa,Iowa) Retrieved from https://pdfs.semanticscholar.org/6d7e/56e8983ccaddc8b828f388b9bb907c447035.pdf
- Brame j.Cynthia Flipping the Classroom, https://cft.vanderbilt.edu/wpcontent/uploads/sites/59/Flipping-the-classroom.pdf
- Bloom, B. S. (1969). *Taxonomy of educational objectives: The classification of educational goals: By a committee of college and university examiners: Handbook 1*.David McKay.
- Bhagat, K. K., Chang, C. N., & Chang, C. Y. (2016). The impact of the flipped classroom on mathematics concept learning in high school. Educational Technology & Society, 19(3), 134–142.
- Bishop, J. L., & Verleger, M. A. (2013). The Flipped Classroom: A Survey of the Research. 120th American Society for Engineering Education Annual Conference and Exposition, 30, pp 1-18.
- Clardy A. (2000). Leraning on their own: Vocationally oriented self-directed learning projects. *Human Resource Development Quarterly*, *11*(2), 105-125. https://doi.org/10.1002/1532-1096(200022)11:2%3C105::AID-HRDQ2%3E3.0.CO;2-5
- Chao, C. Y., Chen, Y. T., & Chuang, K. Y. (2015). Exploring students' learning attitude and achievement in flipped learning supported computer aided design curriculum: a study in high school engineering education. Computer Applications in Engineering Education, 23(4), pp 514–526.
- Danielson, C. (2011). Enhancing professional practice: A framework for teaching.ASCD.
- Defination of Retention. Retrieved from https://www.vocabulary.com/dictionary/retention on 14/3/2019.

- Dick, Walter & Carey, Lou. (2001). The Systematic Design of Instruction. Fifth Edition. Longman., New York USA
- Doman, E., & Webb, M. (2017). The flipped experience for Chinese university students studying English as a foreign language. *TESOL Journal, 8*, pp102–141.
- Flipped Learning Network. (2014). What is flipped learning? Retrieved October 15, 2015, From http://fln.schoolwires.net//site/Default.aspx?PageID=92
- Fralick, M. (2011). College & career success (5th ed.). Dubuque, Iowa: Kendall/Hunt Pub
- Frydenberg M.(2013) Flipping Excel. *Information Systems Education Journal*,11(1) pp 63-73.http://isedj.org/2013-11/ISSN:1545-679X.
- Gagne, R.M.; Briggs, L.J.; Wager, W.W.; Golas, Katharine C.; & Keller, John M. (2005). Principles of Instructional Design. Wadsworth USA .
- Guglielmino, L. M. (1977) Development of the Self-directed learning readiness scale. (Doktoratezi, University of Georgia), Dissertation Abstracts International, 38,6467A.
- Guild, P. B., & Garger, S. (1998). Marching to different drummers (2nd ed.). Alexandria, Va.: Association for Supervision and Curriculum Development.
- Han J. Y. (2015). Successfully flipping the ESL classroom for learner autonomy. *New York State TESOL Journal*, *2*(1), 98–109.
- Hannafin J.M. & Land M.S.(1997) The foundation and assumptions of technology-enhanced students –centered learning environments. Instructional Science :May 1997,Volume 25, Issue 3,pp 167-202
- Heilesen, S. B. (2010). What is the academic efficacy of podcasting? *Computers & Education*, *55*(3), 1063–1068. doi: 10.1016/j.compedu.2010.05.002
- Herreid, C., & Schiller, N. (2013). Case Studies and the Flipped Classroom. Journal of College Science Teaching, 42, pp 62-66.
- Johnson W.L. & Renner D. J (March 2012) Effect of the Flipped classroom model on a Secondary computer application course: Students and teacher perception, questions and

Students achievement. (Doctoral Dissertation, University of Louisville, Kentucky) Retrived fro m https://theflippedclassroom.files.wordpress.com/2012/04/johnson-renner-2012.pdf

- Johnson B.J. (2013) Students Perception of the Flipped Classroom. (Doctoral Dissertation, The University of British Colombia ,Okanagan) Retrieved from https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0073641
- Jonassen, D. H., & Reeves, T. C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (1st ed.). Retrieved from http://www.aect.org/edtech/ed1/
- Kelly L. Graham, Amy Cohen, Eileen E. Reynolds, and Grace C. Huang (*2019*) Effect of a Flipped Classroom on Knowledge Acquisition and Retention in an Internal Medicine Residency Program. Journal of Graduate Medical Education: February 2019, Vol. 11, No. 1, pp. 92-97.
- Knight, J. K., & Wood, W. B. (2005).Teaching more by lecturing less. Cell Biology Education, 4(4), pp 298-310. doi:10.1187/05-06-0082
- Kurtz .G & Tsimerman G. & Lavi S.O. (2014) The Flipped Classroom approach: The answer to future Learning? European Journal of Open, Distance and e-Learning Vol. 17 , No. 2 – 2014 DOI: 10.2478/eurodl-2014-0027
- Krathwohl, D. R., & Anderson, L. W. (2010). Merlin C. Wittrock and the Revision of Bloom's Taxonomy. *Educational Psychologist, 45*(1), 64-65.
- doi:10.1080/00461520903433562
- Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Association Press, New York.
- Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: an exploration of design principles. Internet & Higher Education, 22, 37–50.
- Lankford, L. (2013). Isn't the flipped classroom just blended learning? [Blog post] Retrieved from https://ileighanne.wordpress.com/2013/01/24/isnt-the-flipped-classroom-just-blended-learning/

- Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: a gateway to creating an inclusive learning environment. The Journal of Economic Education, 31(1), 30–43.
- Littlejohn A. & Margaryan A. & Vojt G. (2002) Exploring Students' use of ICT and Expectations of Learning Methods, Electronic Journal of e-Learning 8(1).
- McHugh A.S.(2018) Evaluating the Effects of a Flipped Classroom Compared to a Traditional Classroom on Retention of Information and Course Engagement in a Radiation Safety Course(Doctoral Dissertation, Virginia Commonwealth University, Verginia) Retrived fr om https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=6603&context=etd
- Minjeong KIM & Dongyeon CHOI (2018) Effects of Self-Directed Learning Readiness on Academic Performance and Perceived Usefulness for Each Element of Flipped Learning. Educational Technology International : 2018, Vol. 19, No. 1, 123-151.
- Merriam, S. B. & Caffarella, R. S.(1999) Learning in Adulthood. A Comprehensive Guide. Second Edition. Jossey-Bass Higher and Adult Education Series.
- Newbery, R. (2014). Enhancing the impact of online simulations through blended learning: A critical incident approach. *Education+ Training*, *56*(2/3), 8–8. doi; 10.1108/et-01-2013-0007
- Overmyer, G.R (2014) The flipped Classroom model for college algebra :Effects on Students achievement .(Doctoral Dissertation, Colorado State University Fort Collins,Colorado) Retrived from https://mountainscholar.org/bitstream/handle/10217/83800/Overmyer_colostate_0053A_12525.pdf?sequence=1&isAllowed=y
- Obari, H., & Lambacher, S. (2015). Successful EFL teaching using mobile technologies in a flipped classroom. In F. Helm, L. Brandly, M. Guerda, & S. Thouesny (Eds.), *Critical CALL – Proceedings of the 2015 EUROCALL Conference, Padova, Italy* (pp. 433–438). Dublin, Ireland: Research-Publishing.net. doi: 10.14705/rpnet.2015.9781908416292
- Poon, J. (2014). A cross-country comparison on the use of blended learning in property education. *Property Management*, *32*(2), 154-175. doi:10.1108/pm-04-2013-0026
- Shea P. & Hayes S.& Smith U.S. ,&Vickers J.,& Bidjerano T. & Pickett A. & Gozza-Cohen M. & Wilde J.&Jian S.(2012) Learning presence: Additional research on a new conceptual element

within the Community of Inquiry (CoI) framework. Internet and Higher Education 15 (2012) ,pp 89–95.

- Schultz, D., Duffield, S., Rasmussen, S. C., & Wageman, J. (2014). Effects of the flipped classroom model on student performance for advanced placement high school chemistry students. Journal of Chemical Education, 91(9), 1334–1339.
- Seaman, G., & Gaines, N. (2013).Leveraging digital learning systems to flip classroom instruction. Modern Teacher Quarterly, 1(1), 25-27.
- Sirakaya A. & Ozdemir & Selcuk (2018) The Effect of a Flipped Classroom Model on Academic Achievement, Self-Directed Learning Readiness, Motivation and Retention. *Malaysian Online Journal of Educational Technology*, vol.6 ,no.1, pp76-91
- Slekiene V. & Raguliene L. (2010) The learning Physics impact of interactive lecture demonstrations. Problem of education in the 21stCentuary, Problems of Education in the 21stCentuary, 24.presented at the October/2010.
- Smaldino, S. E. (2005). Instructional technology and media for learning (8th ed.). Upper Saddle River, N.J.: Pearson/Merrill/Prentice Hall.
- Staker, H., & Horn, M. B. (2012). *Classifying K-12 Blended Learning*. San Mateo: Innosight Institute, Inc.
- Sternberger, S.C. (2012) Interactive Learning Environment: Engaging Students Using Clicker. Nursing education perspectives: March 2012, 33(2): pp 121-4 ·
- Talbert, R.(2012).Inverted classroom.colleagues,9:(1)7,pp 18-20
- Thorpe, M. (1988). Evaluating open and distance learning. Harlow: Longman.
- Tsai, C. Y., Chang, C. T., Hsu, J. M., Tsai, H. H., Dai, Z. C., & Yu, P. T. (2015). Toward a Highly Interactive Model of Flipped Learning. In Hybrid Learning: Innovation in Educational Practices (pp. 173-186). Springer International Publishing.
- Wheeler, S. (2001) Information and communication Technology and the changing role of the Teacher, Journal of educational media, 26(1), pp7-17.

- Yusuf, M. O. (2005). Information and communication technologies and education: Analyzing the Nigerian national policy for information technology. International Education Journal, 6(3), 316-321.
- Zappe, S., & Leicht, R., & Messner, J., & Litzinger, T., & Lee, H. W. (2009, June), *"*Flipping" The Classroom To Explore Active Learning In A Large Undergraduate Course*", Annual Conference & Exposition, Austin, Texas*. https://peer.asee.org/4545
- Zainuddin, Z., & Halili, S.H. (2016). Flipped classroom research and trends from different fields of study. International Review of Research in Open and Distributed Learning, 17(3), pp 313-340.